CLAIMS

1. Blasting method for cleaning surfaces, wherein a carrier gas is supplied under pressure through a blasting line (10) to a blasting nozzle (14), and liquid CO_2 is supplied via a feed line (32), is transformed into dry show by expansion and is fed into the blasting line (10), **characterised** in that the CO_2 is introduced from the feed line (32) into the blasting line (10) via an expansion volume (32) having an enlarged cross section, and the volume V of the expansion volume and the internal cross-sectional area A of the feed line (32) fulfill the relation $V^{1/3}/A^{1/2} > 3$.

2. Blasting method according to claim 1, characterised in that the volume V if the expansion volume and the internal cross-sectional area A of the feed line (32) fulfill the relation $V^{1/3}/A^{1/2} > 10$.

3. Blasting method for cleaning surfaces, wherein a carrier gas is supplied under pressure through a blasting line (10) to a blasting nozzle (14), and liquid CO_2 is supplied via a feed line (32), is transformed into dry show by expansion and is fed into the blasting line (10), **characterised** in that the CO_2 is introduced from the feed line (32) into the blasting line (10) via an expansion volume (32) having an enlarged cross section, and the flow rate ratio between CO_2 and carrier gas is at least 0.1 kg/m^3 preferably at least 0.25 kg/m^3.

4. Blasting method for cleaning surfaces, in particular according to claim 3, wherein a carrier gas is supplied under pressure through a blasting line (10) to a blasting nozzle (14), and liquid CO_2 is supplied through a feed line (32), is transformed into dry snow by expansion and is fed into the blasting line (10), **characterised** in that the CO_2 from the feed line (32) is introduced into the blasting line (10) via an expansion volume (34) having an enlarged cross section, and the ratio between the volume V of the expansion volume (34) and the flow rate of CO_2 amounts to at least 0.0002 m^3 s/kg.

5. Blasting method for cleaning surfaces, wherein a carrier gas is supplied under pressure through a blasting line (10) to a blasting nozzle (14), and liquid CO_2 is supplied via a feed line (32), is transformed into dry snow by expansion and is fed into the blasting line (10), **characterised** in that the CO_2 is introduced from the feed line (32) into the blasting line (10) via an expansion volume (32) having an enlarged

cross section, and in that the expansion volume (34) is thermally insulated from the environment.

6. Blasting method according to claim 5, characterised in that the portion of the feed line (32) adjacent to the expansion volume (34) is also thermally insulated from the environment.

7. Blasting method for cleaning surfaces, wherein a carrier gas is supplied under pressure through a blasting line (10) to a blasting nozzle (14), and liquid CO_2 is supplied via a feed line (32), is transformed into dry snow by expansion and is fed into the blasting line (10), **characterised** in that the CO_2 is introduced from the feed line (32) into the blasting line (10) via an expansion volume (32) having an enlarged cross section, and in that a deposition of solid dry ice at the walls of the expansion volume (34) and/or the blasting line (10) is promoted by swirl edges (40) in the expansion volume or at the downstream end thereof.

8. Blasting method for cleaning surfaces, in particular according to one of the preceding claims, wherein a carrier gas is supplied under pressure through a blasting line (10) to a blasting nozzle (14), and liquid CO_2 is supplied via a feed line (32), is transformed into dry snow through expansion and is fed into the blasting line (10) and discharged through a blasting nozzle (14) having a constriction (18), **characterised** in that the CO_2 from the feed line (32) is introduced into the blasting line (10) via an expansion volume (34) having an enlarged cross section, so that a mixture of gaseous, liquid an solid CO_2 is produced in the expansion volume and a part of the solid and liquid components evaporate in the blasting line or the blasting nozzle, and in that the position of the evaporation zone relative to the constriction (18) is determined by regulating the flow of carrier gas.

9. Method according to one of the preceding claims, characterised in that the flow of carrier gas is throttled by means of a meatering valve (26) upstream of the point of entry of the expansion volume (34) into the blasting line (10).

10. Method according to claim 9, characterised in that the carrier gas is supplied to the meatering valve (26) with a pressure of at least 0.1 MPa, preferably about 1.0 to 2.0 MPa.

11. Method according to any of the preceding claims, characterised in that the CO_2 is supplied via the feed line (32) at environmental temperature and under a pressure necessary for maintaining the liquid state.

12. Method according to one of the preceding claims, characterised in that the CO_2 is supplied through the feed line (32) at a temperature of less than -15° C and at a pressure necessary for maintaining the liquid state.

13. Method according to any of the preceding claims, characterised in that the mixture of carrier gas and dry snow is accelerated in the blasting nozzle (14) to at least approximately sonic speed.

14. Method according to any of the preceding claims, characterised in that the expansion volume (14) has a length of at least 15 mm, preferably at least 49 mm.

15. Apparatus for carrying out the method according to one of the preceding claims, having a blasting line (10) for supplying a carrier gas and a feed line (32) for liquid CO_2, **characterised** in that the feed line (32) is connected to the blasting line (10) through an expansion volume (34), and the volume V of the expansion volume and the internal cross-sectional area A of the feed line (32) fulfil the relation

$$V^{1/3}/A^{1/2} > 3.$$

16. Apparatus according to claim 15, characterised in that the cross section of the expansion volume (34) increases from the feed line (32) towards the blasting line (10).

17. Apparatus for carrying out the method according to one of the claims 1 to 14, comprising a blasting line (10) for supplying a carrier gas and a feed line (32) for liquid CO_2, **characterised** in that the feed line (32) is connected to the blasting line (10) through an expansion volume (34), and in that at least one swirl edge (40) is formed in the expansion volume (34) and/or at the transition between the expansion volume (34) and the interior of the blasting line (10).

18. Apparatus for carrying out the method according to one of the claims 1 to 14, comprising a blasting line (10) for supplying a carrier gas and a feed line (32) for liquid CO_2, **characterised** in that the feed line (32) is connected to the blasting line (10) through an expansion volume (34), and in that at least the expansion volume (34) is surrounded by a thermally insulating sheath (44).

19. Apparatus according to one of the claims 15 to 18, characterised in that the internal cross section of a downstream section (38) of the expansion volume (34) is approximately equal to the internal cross section of the blasting line (10).

20. Apparatus according to one of the claims 15 to 19, characterised in that the expansion volume (34) enters into a straight section of the blasting line (10) from one side.

21. Apparatus according to claim 19, characterised in that the expansion volume (34) enters into the blasting line (10) at an angle from 5 to 90° in flow direction.

22. Apparatus according to one of the claims 15 to 21, characterised in that the expansion volume (34) has a length of at least 15 mm, preferably at least 49 mm.

23. Apparatus according to one of the claims 15 to 22, characterised in that a convergent/divergent nozzle, preferably a Laval nozzle, is connected as a blasting nozzle (14) to the downstream end of the blasting line (10).

24. Apparatus according to claim 23, characterised in that the internal diameter of the blasting nozzle (14) at its inlet opening is approximately equal to the internal diameter of the blasting line (10), and in that the internal diameter of a constriction (18) of the blasting nozzle is approximately 15 to 75 %, preferably about 35 to 45 % of the diameter at the inlet opening.

25. Apparatus according to claim 23 or 24, characterised in that the distance between the point of entry of the expansion volume (34) into the blasting line (10) and the constriction (18) of the blasting nozzle (14) is larger than the diameter (DL) of the blasting line (10).

26. Apparatus according to any of the claims 15 to 24, characterised in that a metering valve (26) is arranged in the blasting line (10) upstream of the point of entry of the expansion volume (34).

27. Apparatus according to one of the claims 15 to 26, characterised in that a metering valve (42) is arranged in the feed line (32) directly upstream of the expansion volume (34).

28 Apparatus for carrying out the method according to one of the claims 1 to 14, comprising a blasting line (10) for supplying a carrier gas and a feed line (32) for liquid CO_2, **characterised** in that the feed line (32) is connected to the blasting line (10) through an expansion volume (34) the length of which amounts to at least 15 mm, preferably at least 30 mm.

29. Apparatus for carrying out the method according to one of the claims 1 to 14, comprising a source (40) for liquid CO_2, an expansion nozzle (32) connected to said source, for generating dry snow, and a blasting nozzle (14) connected to a pressure source and converging towards a constriction (18) and diverging from said constriction for accelerating the dry snow, characterised in that the expansion nozzle (32) is arranged upstream of the constriction (18) of the blasting nozzle (14).

30. Blasting apparatus according to one of the claims 23 to 29, characterised that the blasting nozzle (14) is a flat nozzle, having a cylindrical section (14a), a transition piece (14b) and a flattened section (14c), the flattened section having an approximately rectangular internal cross section.